ably. The older methods of obtaining sulfur from its ore by setting fire to it in covered heaps or in kilns, where the sulfur itself served as fuel, have been discarded both on account of the waste and because of the intolerable nuisance to which the fumes of the burning sulfur gave rise. Coal is in general used as fuel, although very expensive. Extraction of the sulfur with carbon bisulfid or with a concentrated solution of calcium chlorid is in many cases used, but the only method in which no noxious fumes are generated is the extraction with steam under pressure. The extent of the industry is rapidly increasing and Sicily will long continue to supply the major part of the world's production.

The use of sulfur as a fungicide is rapidly increasing in the continental vineyards, and for this purpose it is necessary that the sulfur shall be in the most finely divided condition possible. Flowers of sulfur were at first used, and then ground and sifted refined sulfur, but a large portion of even this was wasted on account of the size of the particles. 'Blown' sulfur (*zolfo ventilato*) has lately come into extensive use. The finely ground sulfur is carried by an endless chain into a strong current of air, or for the purpose of avoiding explosions, of gases as free as possible from oxygen. The sulfur dust is carried into large settling chambers where all the larger particles are separated by their more rapid deposition. The sulfur dust thus obtained is pale yellow, resembling precipitated sulfur, and is found to be very satisfactory for fungicidal purposes.

J. L. H.

CURRENT NOTES ON PHYSIOGRAPHY.

PHYSIOGRAPHIC GEOLOGY.

THE increasing recognition of physiography as related to geology is illustrated in Brigham's excellent contribution to the Twentieth Century series ('A Text-book of Geology,' New York, Appleton, 1901, pp. 477, many illustrations). A chapter of forty pages in the middle of the book, devoted to 'Physiographic Structures,' presents a compact epitome of the subject, including a consideration of forms as the result of processes, with a brief exposition of the cycle of erosion and development of drainage. On the other hand, physiographic discipline is not likely to be gained in forty pages, as appears from the scanty treatment of so important a matter as the adjustment of drainage (284–), the explanation of which, as here given, can hardly be appreciated by those who do not already understand it. It may be questioned whether the categorical method of separating folded structures (223–) from the origin and form of folded mountains (256–) is as effective a method of presenting the real earth to beginners as would be found in a closer connection of these naturally associated facts. The same may be said of volcanic processes (135–) and volcanic topography (262–), and of glacial processes (91–) and glacial topography (266–). There may be abundant precedent for the categorical arrangement, and some justification for it in teaching; but a more natural method would bring process and form closer together.

GLACIAL LAKES IN MINNESOTA.

WINCHELL summarizes the history of twenty-six 'Glacial Lakes in Minnesota' (*Bull. Geol. Soc. Amer.*, XII., 1901, 109–128, map), whose geographical consequences are seen in gravel and silt deposits, shore lines and especially in outlet channels. The lake waters were held up by the retreating ice lobes of the Superior and Red river troughs. The most famous of them is Lake Agassiz, so fully described by Upham (Monogr. XXV., U. S. Geol. Surv.). The others were much smaller, and their outlines are at present but imperfectly traced. The outlet channels are of moderate depths, but are usually well defined by banks carved in till; the channel floors are sometimes without streams, sometimes occupied by small streams, sometimes partly covered with shallow ponds or sloughs. The fuller details of this complicated lake system will afford material for local studies for years to come.

ESKER LAKES IN INDIANA.

DRYER, who has already described the 'morainic lakes of Indiana' ('Studies in Indiana Geography,' Terre Haute, 1897, 53–60), now gives an account of 'certain peculiar eskers and esker lakes of northeastern Indiana,' (*Journ. Geol.*, IX., 1901, 123–129, 2 maps). The region concerned is traversed by a series of massive

moraines, the joint product of the Erie and Saginaw lobes of the Laurentide ice sheet. Unusual features abound. "Half-filled valleys and abnormal drainage lines, isolated knobs and morainic outliers, clusters and chains of lakes, kettles and kames conspire with esker-like ridges to produce a type of topography and scenery which seems artificial and almost bizarre." Two of these lakes, High and Gordy's, owe their existence and outline to the presence of eskers, whose origin is ascribed to deposition in tunnels or crevasses in the wasting ice sheet.

THE ONTARIO COAST.

THE Ontario coast between Fairhaven and Sodus bays (near Oswego, N. Y.) is described by J. O. Martin, of Cornell (*Amer. Geol.*, XXVII., 1901, 331–334), as consisting of truncated drumlins connected by stony beaches which enclose bays and marshes. Active 'long-shore movement was noted when waves came obliquely on the shore; a cobble weighing seven ounces was moved sixteen yards in ten minutes by waves whose breaking height was a foot. The recession of the shore line is rapid, in some cases several feet a year. The farmers know this, as they have to set back their shore fences from time to time. Several submerged boulder pavements, having the outline of drumlins but standing at a considerable distance off shore, seem to indicate former drumlins now swept away.

GLACIAL CORRIES IN THE CARPATHIANS.

RECALLING a recent note on corries in the Bighorn Mountains of Wyoming, reference may be made to de Martonne's studies of similar forms in the Carpathians ('Sur la Formation des Cirques,' *Ann. de Géogr.*, X., 1901, 10–16. See also *Bull. Soc. Géol. France*, XXVIII., 1900, 275–319, and *Bull. Soc. Sci. Bucharest-Roumanie*, IX., 1900, No. 4). After a careful study of several examples, this author concludes not only that cirques or corries are certainly of glacial origin, but that they are as safe indication of glacial action as moraines, striations and rounded rocks; that they are of longer duration than the latter, and hence of greater value for the detection of somewhat remote glacial periods; and that they give definite indications of the character of the glaciation by which they were produced, being due to glaciers of the Pyrenean type, and not to a general nor to a local ice sheet. High mountains may thus owe a significant share of their form to glaciation, although whether de Martonne would go as far in this direction as Richter has (see SCIENCE, April 5, 1901) does not appear.

W. M. DAVIS.

SHORTER ARTICLES.

DEFINITIONS OF PHYSICAL QUANTITIES.

THE standards of 'scholarship' must be essentially alike in all branches of knowledge, although differences in detail will show themselves according to the subject. I suppose that the attainment of these standards in the physics of to-day must include accuracy in conceiving fundamental quantities and their connection with each other. Within the past half century much careful thought has been devoted to gaining such clear conceptions and constructing a framework of relation among them. In proportion as the younger physicists inherit the results of that thought undiminished, they will themselves be trained for discriminating and exact thinking. It is therefore a matter of regret that some of our leading authorities are habitually lax in presenting certain definitions that are built into the foundations of mathematical physics. I refer particularly to deliberate statements found in text-books of great general excellence. These are fair marks for criticism, because they must aim at consistent and systematic exposition, and because they influence strongly minds that are in the formative stage. Their example should not encourage a student to confound ideas that are really distinct, nor to tolerate inaccuracy in himself. This can be said without implying a demand for pedantic nicety in writing for experts, who are able to catch the right cue, even from an elliptical expression. I shall illustrate my meaning with a few quotations from Professor Thomson's 'Elements of the Mathematical Theory of Electricity,' and from Professor Webster's 'Theory of Electricity and Magnetism.' These are chosen because they are books of acknowledged value; at the present time each may be taken to register high-water mark within its own range. Since they are representative, we are